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ABSTRACT

Economic, managerial, and political policy issues are associated with public school teachers' collective bargaining. Current economic theories of unionism (public or private) indicate that many collective bargaining effects cannot be deduced from theories but are basically empirical questions. This study analyzed the economic literature and other relevant empirical works of public employees' unionization to identify those topics warranting additional policy-oriented research. The overwhelming majority of previous studies are econometric wage determination models for teachers. In general, these models find that teachers' unions do increase salaries slightly for union rather than nonunion teachers. However, the evidence relating to nonwage issues such as fringe benefits, educational finance, budgetary allocations, capital-labor substitutions, and bargaining processes is not adequate for derivation of educational policy implications. Preliminary empirical and methodological research strategies are discussed to provide a more structured understanding of collective bargaining in public education. (Author/JM)

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COLLECTIVE BARGAINING BY TEACHERS: ISSUES AND EVIDENCE

Wayne D. Perry

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ABSTRACT

This paper discusses some economic, managerial, and political policy issues associated with public school teachers' collective bargaining. Current economic theories of unionism (public or private) indicate that many collective bargaining effects are basically empirical questions. The economic literature and other relevant empirical works of public employees' unionization were analyzed to identify those topics warranting additional policy-oriented research. The overwhelming majority of the previous studies are econometric wage determination models for teachers. In general, these models find that teachers' unions do increase salaries slightly compared to non-union teachers. However, the evidence relating to non-wage issues such as fringe benefits, educational finance, budgetary allocations, capital-labor substitutions, bargaining processes, and so on, is not adequate to derive educational policy implications. Preliminary empirical and methodological research strategies are discussed to provide a more structured understanding of collective bargaining in public education.

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COLLECTIVE BARGAINING BY TEACHERS: ISSUES AND EVIDENCE*

Wayne D. Perry
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I. INTRODUCTION

The basic rights of employees to strike and to bargain collectively have been central issues throughout the history of the American labor movement. In the private sector, legislation and experience, over the past 40 years, has provided labor and management with a reasonably consistent, clear, and stable set of guidelines or rules to follow. However, in the public sector, the structure and procedures have not yet been developed to define the organizing and bargaining rights of public employees, or the authority and prerogatives of public management. The rapid growth in membership, scope of bargaining, and number of strikes by unions in the public sector, particularly teachers, over the past decade has made these issues of national importance.

The Bureau of Labor Statistics reported that between 1968-1974 membership in public sector unions rose by about 60 percent from 2.5 to 3.9 million employees. As an example, for teachers, during the academic year 1967-1968 less than 12 percent of school districts engaged in any kind of employment negotiations [17].[1] However, according to the Census Bureau by 1972 seventy percent of all public school teachers were represented in collective bargaining with local school boards.

Not one state prior to 1960 authorized collective or any other form of negotiations between teachers' organizations and local school administrators [1]. Similarly, during the 1960-61 school year only three strikes

*I would like to thank my Rand colleague Stephen J. Carroll and former colleagues P. Michael Timpane and Stephen M. Barro whose comments were most helpful for this effort. The paper was presented at Rand's Educational Policy Center Site Review by HEW (Washington, DC) on July 8, 1976.

[1]Numbers in brackets denote references.

occurred nationwide, but by the 1970-71 academic year the number had increased to 180 around the country. Such developments have given rise to concern among citizens and parents that teacher collective bargaining may disrupt the efficient delivery of educational services.

The scope of teachers' negotiations has also included professional standards and areas traditionally considered matters of educational policy such as class size, curriculum and disciplinary procedures. Teachers' representatives argue that as trained and experienced professionals, classroom teachers are better qualified than administrators to make decisions on educational policy that directly affects the classroom. Boards of education and school administrators regard these demands as fundamental challenges to managerial authority. Such issues are largely unknown in private sector bargaining. Collective bargaining by professional groups (with their consequent professional concerns) is basically a public sector phenomena, one that Paul Parsaw and his colleagues term ". . . the most important new development in American labor history since the organization of the mass production industries in the later 1930s."[1]

The primary objectives of this paper are to identify those topics that warrant additional study to provide a better understanding of public school teachers' collective bargaining. First, the paper presents a discussion of the policy issues associated with teachers' collective bargaining. Next, the traditional economic theory of collective bargaining in the private sector is analyzed to derive implications for public employees unionization. Although fundamental differences exist between the public and private employees unions, it is deemed appropriate to review and to build on the previous theory and evidence in the private sector. Research in public employees' labor-management relations is not as well-developed as it is in the private sector; however, there is a growing body of literature dealing with unionization among public employees, especially teachers. [16, 29]. The studies attempt to determine what impact public employee collective bargaining has had primarily on wages, but other items such as hours, working conditions, public management, the delivery of public services, and

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[1]Paul Parsaw, et al. [31], p. 17-18.

public finance are also examined.[1] The previous economic and some related empirical literature is analyzed. Finally, the remaining issues are summarized and preliminary empirical and methodological strategies are discussed for future policy-oriented research of teachers' unions' influence on education.

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[1]Issues related to the structure of the bargaining process, union recognition, types of unions and impasse resolution are considered only as they relate to these outcomes.

II. POLICY ISSUES

The presence of collective bargaining in education has produced an array of economic and related policy issues concerning the impact of unionization on the cost and delivery of educational services. The three primary areas of concern are wage and budgetary impacts, management control of educational policy, and the political-public finance effects.

WAGES, BUDGET LEVELS, AND RESOURCE ALLOCATIONS

Starting in the early 1960s wages in general, but especially public employees' wages, have been increasing quite rapidly. One observes in Table 1 that during 1961-1970, various state and local employees' wages increased between 57-77 percent while wages in the private sector increased by 45-51 percent. Furthermore, during the period 1965-1970, teachers and other selected state and local employees' wages increased at a faster rate than either federal employees or non-supervisory employees in private manufacturing (see Table 2).

Teachers and other educational personnel are usually the majority or the largest single group of public employees. A local school district's budget comprises about half of all local revenues and teachers' salaries are between 60-75 percent of the district's budget [17]. Current public attention and most research efforts have focused on teachers' unions' impact on salaries. The implications of increased teachers' wages (and other pecuniary benefits) upon the cost and delivery of public services have *not* been examined systematically.

Many school districts are unique among governmental units since they have independent authority to levy taxes and develop autonomous sources of income. Generally, other groups of public employees do not have this revenue generating ability and education usually comprises the largest single share of local revenues. Given these facts, there is concern that organized teachers may obtain a disproportionate share of public funds. Consequently, wage gains by teachers' unions may increase the level of school budgets and reduce the delivery of other public services such as health, safety, fire protection transportation, and so on. Education does

Table 1

TOTAL PERCENTAGE CHANGES FULL-TIME EQUIVALENT STATE AND LOCAL GOVERNMENT EMPLOYMENT AND MONTHLY PAYROLL PER MAN, BY FUNCTION

	Employment		Payroll Per man	
	1965-70	1961-70	1965-70	1961-70
Education	27.6	60.5	41.8	66.5
Highway	3.4	10.6	38.5	61.6
Public Welfare	47.1	99.5	41.6	68.2
Hospitals	18.6	38.3	51.4	74.4
Health	36.0	55.3	43.6	68.6
Police	29.0	44.9	43.0	75.8
Fire Protection	12.1	18.4	47.7	74.9
Sewerage	10.9	26.4	37.4	59.0
Other Sanitation	11.4	17.9	37.7	59.6
Parks and Recreation	17.2	29.8	34.4	56.7
Natural Resources	12.6	23.6	41.2	65.3
Correction	28.0	54.6	44.9	76.6
Libraries	9.9	N.A.	42.2	N.A.
Employment Security Administration	18.0	N.A.	33.6	N.A.
Financial Administration	12.6	19.0	41.1	61.3
General Control	31.6	45.4	38.2	62.8
Local Utilities	7.0	14.8	38.0	76.2
Private Nonfarm	14.2	27.9	31.4	50.5
Private Manufacturing	7.4	18.8	28.7	44.8

SOURCE: Derived from data found in various issues of *Public Employment* and *Handbook of Labor Statistics*. The private figures are percentage changes in total payroll employment and average hourly earnings of non-supervisory employees. Ronald G. Ehrenberg, "The Demand for State and Local Government Employees," *American Economic Review*, 63, 3, June 1973, p. 367.

Table 2

PERCENT INCREASE IN AVERAGE ANNUAL PAY
FOR SELECTED EMPLOYEES 1965-1970

Occupation	Percentage Increase
Public School Teachers	38.2
Police Patrolmen	45.8
Fire Fighters	43.7
Federal Classified Employees	34.1
Private-Manufacturing[a] (non-supervisory)	28.7

SOURCE: Summarized from U.S. Department of Labor, Bureau of Labor Statistics News Release, No. 359, November 30, 1970, in Allen W. Smith, "Have Collective Negotiations Increased Teachers' Salaries?" *Phi Delta Kappan*, 54, December 1972, p. 270.

[a]Ronald G. Ehrenberg, "The Demand for State and Local Government Employees," *American Economic Review*, 63, 3, June 1973, p. 367.

compete with other public services for revenues obtained from taxes collected by federal, state, and local governments.

On the other hand, increased pecuniary benefits to teachers may or may not result in larger educational budgets. Local school boards purchase various human and physical resources such as teachers, aides, counselors, books, band, athletic, and laboratory equipment, buildings, etc. The quantity and quality of the resources a district can obtain are constrained by their price (wage rates, unit cost of books, etc.) and the amount of the district's budget. The quantity of educational services a district provides depends, in part, on the deployment of the input resources. Therefore, teachers' salary increases as a result of collective bargaining may impose major reallocations of monies set aside for various educational programs (art, music, athletics, etc.), as well as building maintenance and construction, laboratory and other capital equipment [32].

Broader Wage Effects: Spillovers Within Education and Public/Private Effects

Organized teachers' wage gains will have associated spillover effects to non-union teachers, non-union educational personnel within a local district, and to other public employees. One generally observes that salary structures of other educational personnel, e.g., teacher's aides and school administrators, are directly or indirectly related to classroom teachers' salary levels. Therefore, the successful wage and other monetary negotiations of teachers may have a multiplier effect and impose higher implicit salary levels for all school district personnel. A similar effect will occur if increased pecuniary benefits to teachers produce a chain reaction as firemen, policemen, and other public employees demand similar gains.[1]

Unfortunately, these spillover issues concerning the monetary and fiscal impact of union activity are most difficult to measure. The very existence of collective bargaining can affect wages in many sectors of an economy. Non-union regions or sectors may increase wages to reduce the threat of having to deal with organized labor or to remain competitive with unionized sectors in order to obtain an adequate supply of qualified labor.

[1]Of course the reverse wage spillover effect is equally possible from other public employees to teachers' salaries.

Thus, to conclude that collective bargaining or any other factor has changed the wage rates of union members, one must be able to estimate what the general level of wages would have been in the absence of collective bargaining.

The current state of research (in both the public or private sector) provides little evidence of the impact of collective bargaining on the absolute wage levels of union members. The effect may be positive, negative, or neutral, one does not know *a priori* which outcome may result. Most studies concentrate on the relative wage effects of unions and collective bargaining; that is, on issues such as the relative percentage changes of wage and other pecuniary benefits between:

- unionized and non-unionized teachers;
- unionized teachers, administrative and non-professional educational personnel; or
- unionized teachers and other union and non-union public employees.

Assuming that one determines the magnitude of the relative wage differentials between unionized and non-unionized public employees' wages, and that the unionized group has increased relative wages by X percent, the next issue is: Do public sector unions have more "power" to raise wages than similar workers in the private sector? It is frequently argued that wage rates and growth rates are higher in public compared to private unions. The public group is alleged to have more power to raise pecuniary benefits than their private sector counterparts because of the lack of *market constraints* in the public domain to bound their wage demands.[1] Such ability by public employees could have inflationary spillover wage effects in the private sector. That is, private employers in most cases must compete directly with the public sector for the available labor supply. The alleged differential in bargaining power may have direct implications for adopting from the private sector exactly the same guidelines and procedures for labor-management relations with public employees.

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[1]See Section III for some economic theoretical comparisons based on derived demand of public and private unionizations' impact on wages.

NON-WAGE ISSUES: MANAGEMENT CONTROL, WORKING CONDITIONS, AND THE EDUCATIONAL PROCESS

If all teachers gain the right to bargain collectively, the basic motive and the primary objective of their unions is assumed to be to increase the members' economic welfare. This welfare is measured by pecuniary benefits and levels of employment [13]. However, negotiations do expand to include other non-wage issues such as the right to strike, working conditions, hours, seniority, promotion policies, and the like, that may have direct impact on the production, cost, and efficient delivery of educational services. The scope of teachers' bargaining has also extended to items traditionally considered as matters of educational policy. These items of negotiation have included: class sizes, hours worked, curriculum, selection of textbooks, other instructional materials and methods, disciplinary procedures, teacher staffing and qualifications. Bargaining over these matters has produced conflicts with educational administrators and parents relating to authority, control, and the quality of education.

Management Control

In the private sector the items where union demands must be negotiated in "good faith" have been restricted to "wages, hours and working conditions." The professional character of teachers raises special issues concerning bargaining unit determination and the associated scope of bargaining. Local school boards have had difficulty in distinguishing clearly what is to be defined as working conditions and what is to be considered educational policy issues. The conflict and confusion is over what items are a part of management's authority and therefore, are not in the set of legitimate collective bargaining topics. Given that teachers are probably the most professionally-oriented group of public employees, their representatives may be more inclined to negotiate over non-pecuniary matters such as curriculum, testing procedures, textbooks, professional staffing, and so on, which constitute a school district's educational policy. These demands extended into areas that school boards, superintendents, principals, and other educational administrators have traditionally considered their sole prerogative.[1]

[1]Relying on private sector models, much of the impetus of collective bargaining in public education is toward more centralized decisionmaking. Teachers' representatives negotiating with local school boards or other

Cost of Certain Non-Wage Items

Most of the non-pecuniary outcomes (teacher-pupil ratios, hours worked, and even experience or training mix of personnel) and fringe benefit items are easily transformed into monetary costs by merely equating them to employment levels, salary schedules, or equivalent manpower units. Therefore, these items are indirectly pecuniary issues and can be related to the demand for labor and various measurable trade-offs should exist between these non-wage costs of education and wages.

The Educational Process

To the extent that teachers influence the educational process, strikes, changes in hours worked, and classroom size have traditionally been associated with the delivery of educational services. However, other non-pecuniary issues relate directly to the education of students, such as impasse procedures, curriculum changes, instructional methods, textbook selection, merit and promotion policies, and disciplinary procedures. These matters cannot be measured easily in terms of equivalent wage levels or resource costs. Thus non-wage items can affect the educational process in ways that are not easily defined or measured.

Teachers' unions' ability to negotiate matters of educational policy and working conditions at the classroom level may increase their job satisfaction and thus their productivity. The relationship between the psychological benefits of employment and productivity is not well understood [38]; behavioral research has demonstrated only the relationship between job satisfaction and reduced voluntary employee turnover and absenteeism [33].

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state agencies are producing contracts that are binding to all local schools and school districts. Many local community interest groups have the opposite purpose, that is, a shift away from all decisions being made by boards and administrators at central offices. These community groups are advocating budget decisions, teacher and principal staffing, curriculum and other educational policy matters be coordinated with local parents. The groups argue that they represent the local community served by the schools, and therefore should participate in decisions affecting the education of their children. These organizations' objectives are not to exclude teachers and principals from the decisionmaking process but to give the community representatives the controlling authority [28].

Participating in the educational decisionmaking process may provide a general uplife in rank-and-file teachers' morale by increasing their sense of professional integrity, autonomy, and individual dignity. These attitudinal changes may result in a more stable, proficient, and reliable group of teachers, thus reducing personnel replacement and substitution costs associated with a rapidly changing or unreliable supply of teachers. An increase in job satisfaction among teachers in the long run may enhance the education of the district's students.

MULTILEVEL NEGOTIATIONS AND THE FINANCING OF EDUCATION

In many states teachers' professional organizations have historically had strong statewide organizations but weak local affiliations. These organizations developed into labor unions that negotiate at both the local and state levels of government. The demands of teachers' unions have included increasing the state's allocation of funds for public education and improving other terms and conditions of employment.

A school district's budget is composed of federal, state, and local governmental funds derived principally by taxation.[1] Local governments derive revenues from the federal government which are designated for certain public services (education, public health and safety, and so on). A local school district thus implicitly competes for each public dollar with all other federal, state, and local governmental units. Collective bargaining by public teachers cannot be separated from the political process that is inherent in state and local governments' budgetary decisions.

Multilevel and Multilateral Bargaining

The political and corresponding organizational structures of municipal and state governments generate fundamental bargaining strategies. By definition government is fragmented and its power dispersed. It is inherently

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[1] Governments do raise revenues by borrowing; however, deficit spending has been more frequently done at the federal level. State and local governments, while generally precluded by law from using debt to pay for current operations, maintenance, and labor costs, have also been known to engage in deficit spending.

difficult for one to adopt the traditional bilateral (two-party) private sector bargaining model. Because of this pluralistic structure of government--both heirarchal (school boards, commissions, other local, state, and federal officials), and functional (legislative, executive, judicial, and fiscal units)--bargaining in the public sector is hypothesized to be a multilevel and multilateral rather than a uni-level and bilateral process. That is, a process in which more than two distinct interests become involved so that a clear dichotomy between the employee and the management bargaining unit does not exist [20, 29]. Thus, state and local officials other than school boards can directly or indirectly enter the bargaining process.[1] Therefore, the opportunity exists for teachers' unions to "bypass" the designated management bargaining unit and negotiate with a lateral or higher level of governmental authority. In addition, teachers' representatives may not be able to bargain with local school boards on legitimate items that are within the legal scope of bargaining but not within the authority of the designated local management bargaining unit. [illegible] teachers' organizations may simultaneously lobby to the state legislature to increase local tax rates or the educational budget allocations, salary ranges, pension and retirement plans, tenure requirements, and so on. On the local level, teachers' unions may ask the mayor and/or city council to become involved in their negotiations with school boards.[2]

Union Political Activity and Public Finance

This fractionalized structure of government generates frequently given *alternative* explanations why public employees' unions must possess relatively more bargaining power than their private sector counterparts. It is argued that unionized public employees have the ability to exert considerable

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[1]The multilateral bargaining concept can be expanded to include community interest groups.

[2]One may argue that this "bypass" strategy by teachers' unions may be successful only in the short term when a few groups of public employees are organized. As the majority of the other local and state employees become unionized, legislatures will probably soon realize the "chain reaction" they are setting off by yielding to one governmental unit's demands that can escalate overall state and local budgets.

political influence upon public officials with whom they bargain.[1] Municipal and state workers as well as their families are also voters and, therefore, can have a strong influence on determining who is elected to public office. As an organized voting block, teachers' unions can lobby at both the state, local, and ultimately, national level. Moreover, union assistance in the form of lobbying for funds to pay for increased labor costs is frequently welcomed and even encouraged by some local governmental officials. Particularly in the large urban areas, local unions have exercised political pressure on state legislatures to increase tax rates and budget allocations. Teachers' organizations have also supported increases in local taxes by referendums to expand municipal budgets. Under these circumstances the public management's bargaining team may be more vulnerable than private employers to union demands and negotiating techniques.

Teachers' and other public employees' unions will probably be an important component of the developing structural reforms in state and local public finance.[2] Collective bargaining in the public sector is likely to become an integral part of a multilevel political process, one procedure for reaching political and budgetary decisions at all levels of government.

EMPIRICAL QUESTIONS

No relevant theory exists to determine *a priori* the relative magnitude or, in many cases, the direction of the several effects discussed regarding collective bargaining by teachers. Initially, any assessment of the impact of unionization and collective bargaining in education must begin with empirical questions, such as:

- Does collective bargaining, on balance, increase relative salaries and other non-wage costs of education above those that would have prevailed in its absence? What is the magnitude, if any, of the change in educational costs?

- Is collective bargaining changing the structure of state and local governmental financing and budgetary allocations in education?

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[1] See Lewin [24], Summers [39], Wellington and Winter [43].

[2] The fiscal problems confronting cities in many sections of the country (particularly the Northeastern urban centers) may require various alternative methods of financing local government services.

- Has collective bargaining changed management control and authority at the local school district level?
- Has collective bargaining increased or decreased the efficient and effective delivery of educational services?

The general problem is to (1) define the dependent variables relating to wages, costs, financing, and management control, and (2) assess the influence of teachers' collective bargaining on each outcome. The impact of teachers' unionization has been commonly measured by the size of the union membership or the nature of the legal and institutional framework for collective bargaining. The analysis must also control for external labor market and other economic factors that affect wage levels and other bargaining outcomes independent of the degree of unionization. These considerations include monopsony effects, alternative prevailing wages, district regional or state financial characteristics (tax base and rates) and other demographic type variables that attempt to measure the ability and willingness of a community to pay educational costs as well as the relative attractiveness of the district to work in. To aid in the process of evaluating explanatory factors and assessing existing empirical studies, a review of the traditional economic theories of collective bargaining is presented next.

III. SOME THEORETICAL ECONOMIC CONSIDERATIONS

COLLECTIVE BARGAINING, WAGES, AND THE DEMAND FOR LABOR

The goals and motivation from an economic perspective of either public or private unions, while not including all of the diverse causes of unionism, is consistent with many aspects of observed union behavior. The primary objective of unions is assumed to improve the economic welfare of union members, mostly by increasing pecuniary benefits of employment [8, 34].[1] Labor unions may have two different kinds of pecuniary or non-equivalent "wage effects" that are often confused with each other. That is, collective bargaining can change:

- o the general or absolute level or real (or money) wages, and/or
- o the relative wages or the ratios of the wages of particular groups of labor to the average wage of all labor [25].

One would expect the wages of unionized workers *relative* to non-union workers to have risen, and both of the following statements have the same meaning.

- o Collective bargaining has raised the average relative wage of unionized teachers.
- o Collective bargaining has raised the average wage of unionized teachers relative to non-union teachers.

But, even if collective bargaining does raise the average *relative* wage of a union's members--that is, lower the average *relative* wage of non-union members--it *does not* imply that unionization has raised the average *absolute* wage (money or real) of the union's members or lowered the average *absolute* wage of non-union workers. There may be no change in the average absolute wage of, say, all public school teachers. Consequently,

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[1] These benefits should include wage rates, salary structure, fringe benefits, paid vacations and holidays, and other working conditions that can be transformed into wage equivalents rather easily.

the effects of unionization and collective bargaining on the general level of both money or real wages paid public employees cannot be determined from measurements of relative monetary effects.

An increase in the relative or absolute pecuniary benefits and the associated rise in economic welfare is not an unbounded relationship. The employer's demand curve for labor is not normally horizontal but rather has a negative slope for a given level of pecuniary benefits or "wage equivalents." Consequently, any increase in wages gained by collective bargaining is likely to reduce the quantity of union labor sought by employers.

Of course, teachers' unions do not bargain solely for increased monetary benefits, but also for certain levels of employment and other non-pecuniary benefits. However, from the school district's perspective having to hire more teachers than is desired is equivalent to paying a higher salary than is required to attract a given labor supply. Unions are limited in obtaining both the pecuniary benefits and employment levels sought by this relationship between wages and the maximum amount of labor units the employer is willing to hire. Therefore, economic theorists simplify the analysis by assuming that collective bargaining agreements are reached solely by setting pecuniary benefits and the employers can then hire as much labor as they want [8, 25, 34].

ELASTICITY OF DERIVED UNION LABOR DEMAND

Taking as given that unions' goals are to raise pecuniary benefits of their members, what are the factors that determine the magnitude and direction of their ability to accomplish these objectives? The predictions of economic theory governing the relative wage effects of collective bargaining are based on the elasticity (sensitivity) of demand for union labor. In the theory of derived demand, labor is not demanded for its own sake, but rather as an input to the production of some output which is demanded by consumers or the public [27]. Thus, this theory suggests that an employer's demand for labor is derived from the level of consumption of its final output and the availability of the other factors of production. The more inelastic (less sensitive) is the amount

of union labor demanded, the smaller will be the impact of a given wage increase on employment levels and the greater the likely influence of collective bargaining on relative wages [8, 34].

Economic theory suggests four conditions that affect the elasticity of demand for union labor. The demand is more inelastic,

a. the more price inelastic the demand for the commodity produced,

b. the greater the difficulty of substituting other factors of production (including non-union labor and technological innovations) for union labor,

c. the smaller the proportion the cost of union labor is to the total cost of production, and

d. the more price inelastic the supply of the other factors of production [14, 27].

If these four conditions prevail, then a given union has "more power" to raise monetary benefits without drastically decreasing employment opportunities. The first condition, the demand schedule for the final output, is determined largely by consumer behavioral factors. The latter three conditions are based on the production function of a firm or government unit that relates inputs to outputs and is largely a function of technological conditions.

DEMAND INELASTICITY IN THE PUBLIC SECTOR

Empirical evidence indicates that public employees' wages have risen, in the short run, faster than corresponding wages in the private sector [5]. The most frequent economic explanation for the apparent wage differential is that in the public sector there exists a high wage inelasticity of the demand for labor as compared to the private sector [16, 30].[1] The first rationale for this proposition is based on arguments using condition (a) since many government services (health, safety, education, and the like)

[1]Empirical evidence of wage inelasticities in the public sector is given by Ehrenberg [5]. However, this past relative escalation of wages in the public sector could have been a result of the rapid growth of the demand (shift in the demand schedule) for public services not directly related to wage elasticities of demand.

are regarded as *essential* to the general welfare of the public. The elimination of one or more of these services by work stoppages may impose unacceptably high costs on the community who then generate political pressure on elected officials to resume the services. Thus, the level of services demanded by the community (consumers) changes very little with corresponding price increases resulting from a rise in pecuniary benefits to public employees.

Next, using conditions (b) and (d), the price inelasticity is further increased by the technology associated with a government unit's production function. The personal service nature of teaching, fire and police protection, social services, and so on makes it very difficult to substitute physical capital (equipment or machinery) for labor. Because the output of public services is so labor intensive, the amount of labor decreases very little with respect to increased wage levels for public employees. Finally, to the extent that a union can control the supply of labor to a monopolistic or monopsonistic[1] enterprise, such as a governmental entity, its power to raise pecuniary benefits may be enhanced relative to a union in a more competitive environment. Demand is price inelastic because there are few, if any, substitutes for the type of commodities governments produce.

Based solely on these arguments, it would appear that there may be little economic deterrent to public union monetary demands, and public officials have few alternatives but to accept the union's conditions. To some, a logical conclusion to be reached from these theoretical considerations is that restrictions or regulations, not present in the public sector, should be placed on the collective bargaining rights of public employees [43].

MITIGATING FORCES ON DEMAND INELASTICITY IN THE PUBLIC SECTOR

Market and non-market characteristics exist in the public sector not present in the private sector that can tend to mitigate union

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[1] Monopsony is an economic term which denotes a very few to a single (monopoly) purchaser of labor. A monopolistic or monopsonistic buyer can, by his actions alone, directly affect the prices (wage rates) of the commodities they purchase (labor) [8].

bargaining power. As an example, two labor conditions determine the degree of monopsony power present:

- o a single employer in a given region or a very few employers who can form a cartel and collude to set the wage offered to workers, and/or
- o a high level of unemployment or a drastic increase in the labor supply of a given region.

A monopsony in the public sector labor market may act to constrain wage demands for the following reasons.

- o Overall salary levels can be expected to be lower in areas of great monopsony or monopoly power.
- o The ability of unions to raise pecuniary benefits as measured by the relative union and non-union wages may be reduced as a function of the degree of monopsonistic government units.

Public officials may have less incentives not to risk a work stoppage since their associated costs are usually less than in the private enterprise. Tax and other revenues are not generally related directly to the output of public services. Therefore, revenues continue even during a strike. Next, these officials are appointed or elected for some term of office, and there may be little concern about the influence of negotiations on their immediate political future. Furthermore, there is not very much short run pressure on the public employer to reach an agreement to minimize the loss of sales to a competing firm as is usually the case for the private employer.

Labor costs constitute between 60-70 percent of municipal budgets and recalling condition (c) this cost is usually a greater share of total production than in the private sector. In the long run, one can easily think of more reasons in the public versus the private sector to substitute capital such as police patrol cars, helicopters, increase use of computers, and audio-visual aids in education for labor.

All public services are not provided solely by governmental units, there is private garbage collection, security forces, health services, and

even education. Currently the opportunity exists to substitute private production of some normally public services, and this possibility will increase in the future. Given the financial problems confronting many state and local governments, increases in relative pecuniary benefits could provide additional incentives to seek more capital-labor or labor-labor substitutions for public services.

Compensating for the wage increases by adjusting the price of the output is a common strategy in private enterprise. Similarly, increasing tax rates or the tax base may *not* be as easily done in the public sector given current community attitudes concerning overtaxation; that is, the so-called "tax revolt" [16, 30]. These rates are controlled normally by state legislatures and/or require political action in the form of some local referendum to be voted on by the community.

Given all these conflicting arguments and issues, there is no way to know *a priori* the direction and the relative magnitude of the impact of collective bargaining on public sector pecuniary benefits, productivity, budgetary processes, and other related but non-pecuniary outcomes. Basically, the policy issues remain empirical questions. Section IV will examine and analyze some relevant previous empirical efforts.

IV. EMPIRICAL EVIDENCE

This section analyzes the major quantitative empirical research which addresses some of the policy issues regarding collective bargaining by teachers. The great majority of the empirical studies surveyed have attempted to quantify the impact of collective bargaining on the wages of teachers and other public employees. The studies, in general, do not explicitly compare the relative wage effects of public and private employees' unions.[1] Class size is the only non-wage bargaining item examined for teachers, and this item was only investigated in two studies. One of the latter two efforts, also, attempted to incorporate local school district budgets as a related outcome. On the whole, there is a general lack of empirical findings related to non-wage outcomes of teachers' negotiations.

The econometric wage determination models are the most sophisticated studies. However, there are a number of conceptual, empirical, and methodological problems remaining as these models are still evolving. More importantly, most of the crucial non-wage policy issues have not been studied in a systematic empirical manner.

WAGE DETERMINATION MODELS

The wage determination models used in various studies to account for unionizations' effects are similar in design and methodology. All are cross-sectional, primarily using published local, state, and federal data, union records and reports from municipal associations. The econometric models are based on estimated multiple regression parameters to ascertain the partial effects of union strength, labor market conditions, public finance, and other socioeconomic, political, and legal

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[1] A paper by Hammermesh [12] develops a model and empirically tests the impact of non-educational (bus drivers, building trades, and a mix of occupations) public employees' unions compared to similar unionized workers in the private sector. The principal finding is that public unions apparently do not have a greater influence on wages than private unions. The analysis of bus drivers did indicate a slightly larger impact of 3-12 percent with no measurable difference for the other two samples.

characteristics upon wage settlements.[1] The models are estimated for a variety of governmental units, different occupational categories, and a number of recent years. The great majority of the studies are for teachers with the remainder dealing with uniformed services (firemen and policemen).

For the purpose of this paper, the principal findings of these studies are reasonably consistent. On balance, the studies indicate that during the past decade (1960-1971):

- Collective bargaining in the public sector has raised relative wages, by a small amount.
- The existence of formal (legal) bargaining and contractual procedures, not merely the presence of teachers' unions, produces this effect.
- Labor market and economic conditions are more significant than unionization.

These results are valid for a variety of governmental jurisdictions and different public services. The major studies are summarized in the Appendix by three common dimensions: (1) principal findings, (2) research design, and (3) model specification and public services studied.

Model Specification

The statistical models are formulated as a linear multiple regression equation of the following general reduced[2] form:

Wages = f (labor market and economic conditions, public finance variables, demographic characteristics, unionization, and other miscellaneous factors) (1)

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[1] An overview of the classical economic theory implicitly underlying these models on the demand side was discussed regarding public sector collective bargaining in Section III.

[2] In competitive equilibrium, the demand wage (W_d) offered by, say, a school board and the supply wage (Ws) accepted by the teachers' union are identical. This fact establishes the fundamental rationale for a single equation reduced from wage determination model.

Analytically the standard linear model is estimated for a sample of size N and may be expressed by Eq. (2).

$$W_i = B_o + \sum_{j=1}^{p} B_j X_{ij} + \varepsilon_i \qquad (2)$$

$i = 1, 2, \ldots, N$

Where:

W_i = dependent variable measuring (teachers') wages for the i^{th} observation (a district)

$X_{i1}, X_{i2}, \ldots, X_{ip}$ = p-set of independent or explanatory variables for the i^{th} observation. As an example,

1) X_{i1} can measure a labor market factor, say, prevailing wage for similar private sector employment
2) X_{12} is a public finance variable, say, total expenditure per pupil

and so on

B_o = intercept or constant term

$B_1, B_2, \ldots, B_P$ = p-set of linear coefficients associated with each explanatory variable to measure its effects on wages

ε_i = stochastic or random error term for the i^{th} observation

If each variable is stochastically and linearly independent and all variables are measured in the same units, say dollars, then the magnitude of the estimated coefficients represent the relative importance of the related explanatory variable. However, if the explanatory variables are measured in different units, as is generally the case, the size of the regression coefficient may not indicate the

relative importance of an explanatory factor. The coefficient's value can be changed by merely using another unit or dimension to measure the independent variable.[1]

The statistical significance of the coefficient is measured by the value of its associated t-statistic. The usual statistical test determines if the estimated value of the coefficient is different from zero, i.e., if the explanatory factor contributes to the determination of wages. Generally, in the wage determination models the direction and magnitude of the explanatory variable's effect can be ascertained by the regression coefficient.

A few studies estimate a simultaneous system of structural equations. Analytically, the studies use the same linear additive functional forms to represent the models. If two variables are hypothesized to be determined jointly in a causal or behavioral manner, say, teachers' salaries and class size, then more than one equation is required to model this relationship, as shown in Eq. (3) and Eq. (4).

$$\text{Teachers' wages} = f_1 \text{ (class size, unionization, other factors)} \quad (3)$$

$$\text{Class size} = f_2 \text{ (teachers' wages, unionization, another set of factors)} \quad (4)$$

The empirical studies use the same basic statistical methodology (some form of regression analysis); however, there are important technical variations in each model, such as, the dependent variable measuring wages, samples, the inclusion of certain independent variables and how they are measured, and the estimation of reduced or structural equations.

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[1] One method to statistically non-dimensionalize a variable is to standardize its mean to zero and its variance to unity. The so-called Beta coefficients that are estimated by ordinary least square (OLS) regression are an indication of the variables proportion of the variance in the dependent variable explained.

The Samples

All studies used cross-sectional or "snapshot" samples, i.e., teachers' salaries for one academic year. The seminal study of teachers' collective bargaining by Kasper [17] collected aggregate data from each state (and Washington, D.C.) for the 1967-1968 school year. All subsequent studies used samples of individual school districts. Thornton [40] provided a major improvement by first using local districts as the unit of observation. Given that the salary decisions are made by the local school board, this research design yields a more direct measure of a union's impact. Therefore, aggregate state data is probably too macro in scope for this essentially micro wage decision.

A broad range of individual school districts are sampled, from the very small (less than 1000 pupils [26]) to the largest in the nation (cities over 100,000 population [40]) and various intermediate sizes. To control for regional and interstate institutional and economic conditions many studies concentrated on school districts within a given state or county.[1] This research design provides some control for local market conditions, prevailing wages, unemployment levels, monopsony effects, as well as institutional and legal frameworks. Another group of studies produced a comprehensive range of local districts by using nationwide samples.[2] However, this research strategy provides a general but, at best, a very gross reflection of unionization's impact on teacher (or other public employees) wages. To adequately control for many regional, local labor market, and institutional considerations requires a very large national sample.

A smaller group of studies examined non-educational public services in cities of 25,000 or more population. Ashenfelter's [2] study of firefighters was the first effort to look at public employees other than teachers. Later, Ehrenberg [6] also did a study of unionized firemen. Freund [9] lumped all public employees into a single occupational category. All other studies stratified the samples according

[1] See Hall and Carroll [17], Lipsky and Drotning [26], Frey [10], and Chambers [4].

[2] See Baird and Landon [23], Thornton [40], Schmenner [35], Ehrenberg [6], and Ehrenberg and Goldstein [7].

to occupation to control for individual job characteristics, institutional structures, and evolutionary (historical) aspects of labor-management relations for different public services. Two studies analyze separately a number of occupational groups: Schmenner [35] includes teachers and non-educational personnel while Ehrenberg and Goldstein [7] only includes non-educational employees.[1] Combining these few studies of non-educational public employees with those for teachers produces a representative sample of wage negotiations during the formative years of public sector unionization.

Dependent Variables Measuring Wages

Each study uses some measure of wages as the primary "dependent"[2] variable. Two general measures are

- o average salaries[3] and
- o salaries at various levels in the pay scale.[4]

Average pay, say for a state, provides, at best, a very gross indication of unionization's impact on wages. The second measure of wages enables one to perform a more detailed analysis. Looking at several fixed steps in the salary scale for teachers' controls for seniority and employee qualifications. This approach allows one to uncover systematic variations in wages due to collective bargaining,

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[1] Streets and highways, police, fire, sewerage and sanitation, parks and recreation, administrative personnel in the executive branch, libraries, and so on.

[2] If a structural model is estimated, the jointly determined variables are called endogenous and the predetermined or external conditions are termed exogenous.

[3] See Kasper [17], Hall and Carroll [11], Schmenner [35], Ashenfelter [2], Ehrenberg [6], Lipsky and Drotning [26], Freund [9], Ehrenberg and Goldstein [7].

[4] See Baird and Landon [23], Thornton [40], Lipsky and Drotning [26], Frey [10], Schmenner [35], and Chambers [4].

i.e., the apparent disproportionately greater influence or preference to negotiate larger wage gains at the upper level of the salary scale. (See Thornton [40] and Lipsky and Drotning [26]).

WAGE EXPLANATORY FACTORS

Unionization

The primary independent variable measures the existence or extent of unionization. Mainly two[1] measures of unionization are used:

- the proportion of the public employees (usually in a particular occupation) who are union members,[2] and
- the existence of a formal[3] collective bargaining contract (usually measured by a binary [0, 1] summary variable).[4]

The rationale for the first measure of unionization is that it increases demand inelasticity by controlling the labor supply. In the long run a union may become the sole (or monopoly) supplier of a certain group of employees. A larger number of union members should enhance the political power and activities of the union. The recognition of a bargaining unit and the socio-political environment of a region are presumed to represent the legal and other favorable institutional factors producing increased membership, union activity, and scope of bargaining.

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[1] Other measures of unionization include the occurrence or number of general work stoppages (strikes) by Freund [9] and Schmenner [35], respectively.

[2] See Kasper [17], Schmenner [35], Freund [9], Chambers [5], Ehrenberg and Goldstein [7].

[3] The term "formal" collective bargaining implies the municipality's or school district's recognition of the union as the sole bargaining agent of the group of public employees and the signing of written (legal) contract between the designated government unit and the union.

[4] See Kasper [17], Thornton [ ], Hall and Carroll [11], Lipsky and Drotning [26], Frey [10], Schme[illegible]35], Ehrenberg [6], and Chambers [4].

Labor Market and Other Economic Conditions

Monopsony. Several studies attempt to account for the degree of monopsony[1] present in the sampled labor market. Primarily two measures are used:

- the size of the governmental unit (usually some function of population, say, school district size),[2] and
- the number of separate competing governmental units[3] (i.e., the number of school districts in a county).

The public employer's monopsony power is hypothesized to become greater the larger the size of the governmental units jurisdiction. The monopsony effect should decrease the greater the number of competing districts in the relevant observation unit.

Prevailing Wages. The public sector must compete with the private sector for qualified employees. The private sector prevailing wage rates for the local labor market is the prospective public employee's alternative opportunity wage. The area wage levels are set by economic market forces as well as collective bargaining.

Two basic measures are used to indicate private sector wages:

- the aggregate (average or median) private wages, say, for the non-supervisory manufacturing labor force in a county or SMSA;[4] and
- the (average or median) private sector salary in a similar occupation (usually nurses in the teacher studies).[5]

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[1] Monopsony is an economic term which denotes a very few to a single (monopoly) purchaser of labor. A monopolistic or monopsonistic buyer can, by his actions alone directly affect prices (wage rates) of the commodities they purchase (see Section III).

[2] See Kasper [17], Thornton [40], Hall and Carroll [11], Lipsky and Drotning [26], Frey [10], Ehrenberg [6], and Chambers [4].

[3] See Baird and Landon [23], Schmenner [35], Ehrenberg and Goldstein [7].

[4] See Thornton [40], Schmenner [35], Freund [9], and Ehrenberg [6].

[5] See Chambers [4], Frey [10].

The latter measure is probably the more accurate indication of the public employees' alternative private sector wage.

Quality of Labor Supply. If one assumes that the labor force is not homogeneous, then certain measures of human capital should indicate, in some broad sense, the quality of the labor pool. More importantly, most public teachers' salary scales are based solely on experience and level of education.

Two measures were used to control for teacher quality

- o teachers' length of service,[1] and
- o proportion of teachers with advanced degrees.[2]

Public Finance and Demographic Variables. There are several rationales given for the inclusion in wage determination models of a municipality's or a school district's ability or willingness to pay for public services. Using classical consumer demand theory, various budget levels or rates of taxation reflect the public's demand for a given service. Therefore, public finance-type variables may measure variations in the "quantity" of the public service delivered rather than the difference in the input factor costs of a given output. This rationale highlights a fundamental problem of any economic analysis of the public sector. That is, the lack of understanding and the ability to measure output, say, the quantity (or quality) of education delivered to children in the public schools.

Another obvious rationale for considering public finance variables in a wage determination model is their values represent the relative difficulty the unions may have in obtaining these gains. It is assumed the more financial resources available in the district the easier it will be for unions to raise the wages of public employees.

A related group of demographic variables such as proportion white-collar workers, aggregate educational levels, and proportion minority are also included. Communities having more educated, white-collar workers with fewer minorities are hypothesized to be willing *and* able to pay more for education.

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[1] See Hall and Carroll [11], Lipsky and Drotning [26].

[2] See Lipsky and Drotning [26], Kasper [26]. Chambers [4] used the proportion of elementary teachers as an indirect measure of quality.

Therefore, the measures of the ability or willingness to pay for educational services include:

- o average family or per capita disposable income;[1]
- o property tax rates or property tax base per pupil or per capita;[2]
- o local/state and/or federal expenditures per pupil;[3] and
- o educational level, proportion white-collar worker, proportion minority.[4]

Wage Spillover. A number of studies allude to the spillover effects of union wage increases to non-union employees in the same public service or city as well as to other non-unionized regions. However, only the most recent studies by Chambers [4] and Ehrenberg and Goldstein [7] attempt to account for spillover effects explicitly in their model formulation and estimation. Both studies try to measure spillover effects between geographic areas and occupations.

Chambers [4] provides the only analysis of spillover for teachers.[5] This study of California school districts attempts to account for:

- o impact of unionized local districts on the wages of non-unionized districts within the same region (a county); and
- o the spillover effect within a district to non-unionized teachers and administrators (principals and superintendents).

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[1] See Kasper [17], Baird and Landon [23], Hall and Carroll [11], Frey [10], Ehrenberg [6], and Chambers [4].

[2] See Baird and Landon [23], Lipsky and Drotning [26], Frey [10], Schmenner [35], and Ehrenberg [6].

[3] See Kasper [17], Baird and Landon [23], Hall and Carroll [11], Chambers [4], Ehrenberg and Goldstein [7].

[4] See Ehrenberg [6], Chambers [4], Ehrenberg and Goldstein [7]. These demographic variables are also incorporated to reflect the non-pecuniary attractiveness of employment opportunities across school districts on the supply side.

[5] Ehrenberg and Goldstein [7] account for spillover effects between (1) non-educational public employees and (2) suburban to urban municipalities.

PRINCIPAL FINDINGS OF THE WAGE MODELS

Magnitude of the Relative Wage Effects

Teachers. Most of the models of teachers' salaries estimate the increase due to collective bargaining to be no more than 5 percent of existing salary schedules. However, using eleven major cities, Schmenner [35] estimated 12-14 percent, a sample of California's districts yields 8-17 percent, and in the upper ranges of salary schedules Thornton [40] found a 23 percent increase due to unionism.

Other Public Employees. The studies yield compatable, but on average higher, measures of union impact on the salaries of fire fighters and policemen, i.e., 0-15 percent.[1] Unionization may have had less effect on the wages of all municipal employees in the aggregate. There is some fragmented evidence that public employees in highway, sewerage, sanitation, parks and recreation, water supply, and libraries may receive lower measurable wage benefits from unionization.[2]

Understatement of the Wage Impact--Regional and Local Spillover Effects for Teachers

The findings of all the wage determination models should be evaluated with caution since they may have systematically underestimated the impact of public sector collective bargaining. This understatement may arise from the "spillover" effect of unions on non-union workers, wages in the same governmental service or city, and in other neighboring non-union cities. This spillover effect can result in general teacher salary gains on a local and regional basis, thus reducing the measurable differential between wages in the union and non-union sector.

There are theoretical considerations as well as empirical evidence that unions produce this external wage effect to non-unionized teachers and other educational personnel. Moreover, in a given district the salaries of administrative and non-professional educational personnel are implicitly or explicitly related to classroom teachers' salaries. The wage increase

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[1] See Ashenfelter [2], Ehrenberg [6], Schmenner [35].

[2] See Ehrenberg [7], Freund [9], Schmenner [35].

to administrators within a unionized district was of the same order of magnitude (4-12%) as classroom teachers (8-17%). The spillover effects within a district were on average not as great as regional spillovers.[1] Thus, these findings provide some empirical evidence that the absolute wage effect could have reduced the estimated wage impact of the other studies.

Spillover to Other Public and Private Employees

A chain reaction can occur to other public employees as they seek some equity or parity with teachers' wage gains.[2] Thus, an increase in teachers' salaries may result in an overall escalation of other governmental units' personnel costs.

Many private firms must compete directly with educational and other public employers for a qualified labor supply. That is, if teachers and other public employees have more bargaining power than their counterparts in the private sector, there may be an inflationary trend in wages throughout the entire economy. Given that teachers and other educational personnel comprise the largest single group of public employees, there has been no attempt to empirically model the relative or absolute wage effects of unionized teachers with similar private sector union or non-union employees.

Impact of Union Activity

Some weak evidence exists that union strength as measured by cities where more than 50 percent of all public employees are unionized compared to cities with less unionization experience increased weekly wages (about $7 per worker) [35]. Also, the legal or statutory right of a union to negotiate and produce a formal contract does appear to be significantly related to increased wages in most studies.[3] However, measures of union activity

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[1] See Chambers [4].

[2] Ehrenberg and Goldstein [7] account for spillover effects among non-educational public employees, and between suburban to urban municipalities. The suburban wage levels tend to carry over to central city employees, instead of vice versa. There were significant suburban to urban spillover effects [1 - 9%]. This study of non-educational personnel indicated there was also important inter-occupational wage spillover [18 - 28%].

[3] See Enrenberg [6], Landon [23], and Thornton [40]. Schmenner [35] indicates that the impact of the collective bargaining contract is unclear. However, there are problems of multicollinearity and interactions because both union size and formal bargaining contracts are used as explanatory factors.

such as number of strikes, political activism, compulsory arbitration, and legal sanctions against bargaining had no statistically significant[1] effect on wages [5]. Therefore, just the presence of public employees' organizations or unions without some legal or structured institutional framework apparently may not have a direct and measurable effect on wages. Apparently, governmental recognition of a single union as the bargaining unit and the signing of a formal contract along with all the contributing legal, political, historical, and social factors this represent are the most important measure of a union's influence on wages.

Impact of Labor Market, Economic Conditions, Public Finance, and Demographic Variables

Most studies include a number of labor market variables and other factors to control for their effect on wages. These explanatory variables include:

- o comparable wage opportunities in the private sector and for other public employees;
- o regional and local unemployment levels;
- o median family disposable incomes;
- o public finance variables--property assessment, tax rates, property mix (industrial, commercial, residential); and
- o other demographic variables that indicate a city's ability or desire to generate public revenues.

One or more of these labor market and public finance type variables are uniformly important in all of the studies surveyed. The most significant and consistent market effect on the wage of public employees is the comparable prevailing wage in the private sector. Its inclusion reduces dramatically variations in unionization's effects on public employees' wages.

Several studies incorporate measures of the effects of public employers' monopsony power in large metropolitan areas and small isolated cities.

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[1] As measured by the associated coefficients t-statistics.

The results are not conclusive, but there is evidence that the monopsony effect may be important in the market for teachers.[1] Teachers' salaries appear to be lower where school districts are few and/or isolated, and larger in the metropolitan areas and where there are many small districts competing for teachers [22].[2]

NON-WAGE STUDIES

All the wage models focused on direct money income (wages and salaries) and essentially neglected non-wage benefits. Yet, the amount of fringe benefits has been traditionally high for public teachers.[3] Also, teachers (as well as other public employees)[4] might prefer to trade-off some direct pecuniary benefits for more satisfying working conditions such as smaller classroom sizes, greater job security, disciplinary procedures, and participation in curriculum and textbook selection. Collective bargaining by teachers has often extended beyond wages to other conditions of employment. Certain trade-offs between wage and non-wage benefits should enter into teachers' negotiations; for example, teachers may be willing to trade off leisure time (up to a certain point) for increased wages.

Class Size Models

Any estimated impact of bargaining on salaries and classroom size is the net effect of two opposing teacher supply and demand factors. First, increasing the wages of teachers by collective bargaining should reduce

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[1] See Ehrenberg and Goldstein [7], Baird and Landon [22], Schmenner [35]. Thornton's [40] comment argues that the monopsony effect appears insignificant on teachers' salaries.

[2] The two studies on fire fighters report that the union effect on both wages and hours worked are greater in the smaller municipalities than in the large metropolitan areas.

[3] These fringe benefits include: retirement and pension plans; paid vacation and holidays; paid sick and other leaves of absence; health and medical benefits, etc.

[4] The two studies by Ashenfelter [2] and Ehrenberg [6] of fire fighters found that unionization reduced the number of hours worked and also *increased* wages. The results indicated that fire fighters' unions shorten working hours up to 9 percent with an equivalent maximum increase in hourly wages of 18 percent. Given that only single equation reduced form models were estimated, it's doubtful that the sign of the coefficients would change even if the studies had used a more appropriate structural model.

the demand for teachers, i.e., increase class size. However, large classes are generally regarded as undesirable employment conditions by rank-and-file teachers. Therefore, an increase in bargaining power may include a demand for smaller classes increasing the demand for teachers. Empirically the net result of these two bargaining forces would be observed.

Only the studies by Hall and Carroll [11] and Chambers [4] attempt to simultaneously model the trade-off between class size and wages in bargaining contracts.[1] Unfortunately, in Chambers' study class size was not a legitimate bargaining item for California districts; and collective bargaining was found not to be a significant determinant of class size. However, in Hall and Carroll's study of school districts in Cook County (Chicago area) class size was a legitimate bargaining matter. Collective bargaining in the Cook County study had a weak but significant influence by increasing class size. Both studies indicate that independent of unionization efforts, school boards are offering larger salaries for increased class size and that teachers are accepting the offer.

Multilateral Bargaining Models

Only one study of fire fighters has attempted to develop and test empirically a quantitative model that reflects a composite index of various wage and non-wage negotiated items. (See Kochan and Wheeler [19].) A series of articles have tested a theory of multilateral bargaining at the local level for firemen (see Kochan [20, 21]). Empirical tests are based on a single data set using a questionnaire survey of negotiators and other public officials in 228 cities and in 42 states where there is formal bargaining with fire fighters. Unfortunately, the dependent variable is a composite index of all items successfully negotiated by each union sampled. A series of articles by Kochan [20, 21] using the same data set have tested empirically a theory of multilateral bargaining reflecting the fractionalized management authority for fire fighters. These investigations use the degree of multilateral bargaining at the local level as the dependent variable and the main findings are that:

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[1] Two other studies of teachers' wages rather dubiously included pupil-teacher ratios as an independent (exogenous) variable. The rationale was that average class size and total district size reflect the level of productivity or quantity of educational output in the demand side. (See Thornton [4] and Lipsky and Drotning [26].

- Fragmented power and diverse goals within the public sector management team leads to internal conflict. This internal management conflict, in turn, is the most important direct determinant of multilateral bargaining.

- Union political pressures and union negotiation tactics have direct effects on both internal conflict and multilateral bargaining.

- The primary causal direction of the variables in the model is from the intergovernmental conflict stage to the multilateral bargaining stage.

V. CONCLUSIONS AND DIRECTIONS FOR FUTURE RESEARCH

This paper has revealed a lack of quantitative and systematic empirical research on most of the important non-wage issues confronting policy-makers concerned with collective bargaining by teachers. The overwhelming majority of the empirical studies have focused primarily on *one* economic concern, relative wage effects between union and non-union teachers. The few studies that attempt to develop and test empirically models that include other outcomes and bargaining strategies, either do not include teachers, are incomplete in the formulation and/or produce ambiguous results. Any comprehensive study of collective bargaining by teachers must address a broader range of issues if one is to develop an understanding of its impact on education. The major policy issues will be discussed briefly along with substantive and methodological limitations of previous studies. The overall conclusions indicate that structural models of teachers' collective bargaining effects should be developed for future policy-oriented research.

POLICY LIMITATIONS OF PREVIOUS RESEARCH

The issues center on the assessment of the impact of teachers' collective bargaining on four general policy topics at all levels of government:

- the efficient and effective delivery of educational services to students;
- the cost of educational input resources;
- the financing of public education and the allocation of these funds; and
- management prerogatives and the general control of educational systems.

Clearly, many of the policy issues are interrelated and, thus, cannot be considered independently. As an example, the control of certain educational policy items by, say, local school boards should effect the process of educating children.

The Educational Process and Negotiated Educational Policy

The only educational policy matter or so-called negotiated working condition that has received any empirical study is student-teacher ratios. The sparse evidence indicates that school boards are willing to offer and teachers are accepting larger class sizes for increased salaries. The impact of collective bargaining itself on class size is unclear. There is weak evidence that bargaining effects class size. However, only one empirical study analyzed its influence where pupil-teacher ratios was a legitimate item for negotiation. More important, there is no proven relationship between class size and the education of children.[1] Therefore, this economic trade-off may not have a significant effect on, say, student achievement.

Given the professional nature of teachers, the scope of bargaining has expanded to include hours of work; selection of textbooks and other instructional materials and methods; teacher qualifications, and assignments; disciplinary procedures and the like. There is no empirical evidence from which one can assess the impact on the educational cost or quality of these negotiated items that have traditionally been considered the sole prerogative of educational management.

To the extent that collective bargaining and its outcomes are increasing rank-and-file teachers' morale, professional prestige, and similar psychological employment factors there exists the possibility of improved delivery of educational services. Many behavioral science researchers have found that the global concept of job satisfaction reduces employee turnover and absenteeism. Other studies have also discovered some relationship between satisfying work and productivity. Collective bargaining in the long run may result in a more experienced, reliable and proficient group of teachers and consequently enhance the educational process. No empirical study surveyed has attempted to examine these issues associated with the unionization of teachers.

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[1]"Final Report of the President's Commission in School Finance," Government Printing Office, Washington, D.C., 1972, p. xviii.

Exclusion of Fringe Benefits and Other Non-Wage Costs of Education

All previous studies focused on direct money wages with no consideration of the fringe benefit package or other non-wage educational costs. These non-salary pecuniary benefits such as retirement and pension plans, paid vacations and holidays, health plans, sick leave and the like have been major portions of public teachers' compensation. One can certainly hypothesize teachers making trade-offs between these and other non-wage benefits such as class size, hours, staffing assignments, employment qualifications, etc., and direct wages. Again one finds no empirical investigations to ascertain the impact of teachers' collective bargaining on the fringe benefit package or more satisfying working conditions that can be directly related to the total cost of education.

Multilevel-Bargaining, Financing of Education, and the Budgetary Process

Collective bargaining by public teachers is a part of the political-budgetary process at all levels of government. A form of "multilevel" bargaining strategies have developed reflecting the hierarchical (local, state, and federal) structure of government. Similarly, multilateral negotiations are taking place at the local level with superintendents, school boards, mayors, city councils, etc. Therefore the traditional bilateral private sector bargaining model does not apply for public teachers. The demands at the local, state and federal level have included larger budget allocations for education along with improved terms and conditions of employment including pensions and retirement plans, salary ranges, health plans, and so on. There have been no quantitative empirical studies of the form, degree, budgeting impact or wage effects of multilevel or multilateral negotiations in education.[1]

In many urban areas the assistance of teachers' unions by school administrators has been solicited and gladly received to increase tax rates and/or budget allocations at the state and federal level for education. Teachers' organized voting blocks and financial support

[1] Only one study using a sample of California districts included local budgets as a "dependent type" variable. See Chambers [4].

have also been used to exert political pressure for local tax referendums, nomination, and election of public officials at all levels of government. The financial problems confronting many of the nation's larger cities have generated increased proposals for alternative funding of local public services at the state and federal level. Public sector unionization and collective bargaining are integral parts of political-budgetary processes, another procedure for political decision-making. In sum, these facts indicate that long-run structural changes may occur in local, state, and federal financing of public education.[1]

Resource Allocations Within Local School Districts and Among Public Services

The public sector and education in particular are highly labor intensive enterprises. Public employees' salaries and related benefits comprise usually 70 percent of local budgets with educational budgets generally about half of all local revenues. Since the largest share of a district's budget is allocated for teachers' salaries, a significant increase in their salaries may be at the expense of other educational programs such as laboratory equipment, art, athletics, etc., or maintenance and construction of facilities. Moreover, education may receive a disproportionate share of total municipal revenues and result in a reduction in the delivery of other public services including health, safety, transportation, and so on. One finds no empirical evidence of the impact of collective bargaining on the allocation and

[1]The "by passing" of the designated management bargaining units has increased and is a result of internal conflicts between various governmental authorities. Also as the scope of bargaining expands to other non-pecuniary matters there is concern of who is controlling and formulating educational policy. The multilevel and multilateral negotiations and the hypothesized loss in efficiency and increased conflict associated with it has resulted in a strong impetus to have greater centralization of authority in education. This proposed increased concentration of power is diametrically opposed to the thrust of many community interest groups advocating more local control over neighborhood schools in terms of staffing and educational policy. Again there is no systematic and objective evidence from which one can reach conclusions with confidence concerning these issues of collective bargaining's impact on managerial authority and who controls local public schools.

distribution between education and other public services or within local educational districts.

METHODOLOGICAL LIMITATIONS

Multicollinearity

Many of the econometric models are in the early stages of development and may not be sophisticated enough for this complex problem. One would think that severe multicollinearity problems may be present since many of the market conditions, legal structure and union variables can be expected to be intercorrelated. For example, the mere existence of comprehensive collective bargaining legislation may influence the size and political activity of unions, per capita disposable income affects property assessments, average class size is affected by population of the district, and on and on. These conjectures imply redundancies among the independent variables which can result in instability (low precision) in the estimated regression coefficients. Those instances where there are alternative attempts to measure the same basic factors present no serious problem since little information is lost by simply adopting one measure or by combining them into a single index. However, instances of high intercorrelation among measures of conceptually or theoretically different phenomena are much more troublesome. Thus, it is sometimes necessary to admit that what may be conceptually different is not empirically distinguishable for a given sample.

The above considerations infer a good chance exists that certain explanatory variables interact with each other. As an example, a city's ability to raise revenues is probably a function of the local and regional labor market structure. Some of these possible interactive effects have been controlled for by multiplicative models[1] and by stratifying the sample according to the hypothesized interactive variables.[2]

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[1] See Ashenfelter [2], Freund [9], Frey [10], Lipsky and Drotning [26], Schmenner [35].

[2] See Kasper [17]; Lipsky and Drotning [26].

Cross-Sectional Bias

Another possible understatement of union influence exists since all of the studies are based on cross-sectional equilibrium analysis when public sector bargaining was a very new and rapidly growing phenomena (1960-1971). During this period, there were relatively rapid wage gains by public employees in general (union and non-union). Unions have been found to be relatively less effective in obtaining wage increases when there is a sharp increase in the demand for labor or during inflationary periods [25].[1] However, the rapid increase in the demand for public school teachers appears to be declining as a result of current population trends for school-age children. Furthermore, union labor-management relationships were not very mature and may be drastically different in the long run. Therefore, even if the results of the models were accurate, using the "snapshot" approach of sampling only a few early years, may be too premature to serve as grounds for policy recommendations. If the salary levels in both the union and non-union districts were set prior to the presence of unions, these models could suffer from the classical cross-sectional (temporal) bias that can result in econometric studies. The customary alternative approach to reduce or eliminate this problem is to use longitudinal data, where government units are sampled before and after the existence of collective bargaining.

Structural Models for Policy Analysis

Probably the most fundamental methodological issue relates to developing structural (causal) models rather than reduced (explanatory or predictive) models for policy analysis. Using reduced form models has several limitations, particularly using cross-sectional data. The limitations include:

- The direction of the causality cannot be ascertained.

[1] Counteracting the demand effect, private sector research indicates that unions typically have their greatest impact on wages during the first years of bargaining (See Lewis [25], Rees [34]).

- o There is the possibility of a contemporaneous feedback effect existing between certain "dependent" and "independent" variables.
- o Any change in the underlying behavioral relationship over time also affects the estimated parameters.

The single equation regression models use ordinary least squares (OLS) estimation procedures. A structural model would consist of at least two simultaneous regression equations and the parameters are estimated by the two stage least squares (2SLS) statistical technique.[1] The overwhelming majority of the studies estimated the simpler reduced form or explanatory models. These models may be used for prediction or gross examination of the effects of individual explanatory variables. However, if one assumes *a priori*, that a structural or causal relation exists between certain behavioral outcomes or decision variables, the reduced form model is not generalizable. More importantly, a contemporaneous feedback relationship (simultaneity) occurring between two outcomes in a causal manner may produce single equation models with biased and inconsistent estimated coefficients. However, the greater insight provided by a more general simultaneous equation model is realized at the expense, often times, of greatly increased estimation and interpretation difficulties.

Only three studies, all for teachers, developed and actually estimated simultaneous structural models.[2] The original work by Kasper [17] formulated a recursive model between unionization and wages.[3]

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[1] See Johnston [15] for an introductory discussion of simultaneous model estimation techniques.

[2] See Kasper [17], Hall and Carroll [11], Chambers [4].

[3] A primary reason the recursive model was estimated by Kasper [17] was to lessen the severe multicollinearity problem in the wage determination model. This rationale is inappropriate, simultaneous models and more specifically two stage estimation techniques do not eliminate or reduce the problems of multicollinearity. In fact, the presence of collinearity may actually become more troublesome in structural models by producing empirical identification problems.

Unionization ⟶ Wages

That is, unionization was first estimated using OLS as a function of several variables[1] (most notably wages and non-wage benefits were excluded). The predicted values of unionization for each observation are then used as explanatory variables in the wage determination equation. Kasper [17] found a positive and significant association between increased proportion of local financing of education and unionization. This result is interpreted to imply that school districts which must rely heavily on local funds tend to have salaries and working conditions which cause more teachers to join unions. It would appear that some measure of wages and working conditions would have been included directly as endogenous variables or at least as an explanatory factor.

Next, the Hall and Carroll [11] model included the non-wage negotiated item, pupil-teacher ratios and wages as endogenous. First, it was hypothesized that teachers are likely to demand higher wages as compensation for more students per class. That is, larger classes produce salary increases.

Class size ⟶ Salaries

However, if the local school districts budget is assumed fixed, boards of education must increase the pupil-teacher ratio to accommodate demands for higher salaries. In other words, higher salaries cause larger classes.

Salaries ⟶ Class Size

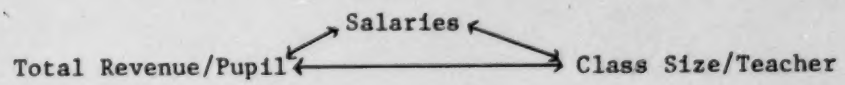
[1] The exogenous or explanatory variables include: urbanization, proportion of teachers with substandard teaching certificates, proportion of total education expenditures financed by local governments, proportion of elementary school teachers, and proportion of (non-agricultural) labor force unionized. Kasper [17] was the only surveyed study that considered unionization as endogenous and reported the estimated results.

Therefore, a simultaneous or contemporaneous feedback relationship may exist in a causal manner between class size (demand) and salary levels (supply) for teachers.

Salaries ⟷ Class Size

Collective bargaining further complicates the relationship, because teachers' unions respond to the members' preference for smaller classes and during negotiations demand a decrease in pupil-teacher ratios.

Finally, the major contribution of the recent study by Chambers [4] was to relax the budget constraint. The local district's budget was not considered a predetermined fixed amount, but was included as an endogenous variable along with wages and class size in a structural system. Collective bargaining was assumed to raise the relative price of educational services by gaining higher salaries, and to affect a community's resource allocations to education measured by the school district's budget. The structural model estimated and reported by Chambers [4] is represented diagrammatically as



Chambers' [4] study of California districts also examined the possible simultaneity between collective bargaining and teachers' benefits. That is, the presence of unions may be a result of the level of teachers' salaries as well as teachers' salaries being determined by collective bargaining:

Unionization ⟷ Salaries

This hypothesized feedback loop was tested empirically and rejected, no simultaneity was found between unionization and terms of employment. The model is tested using cross-sectional data, after the presence of unions in many districts, therefore, because of temporal biases or spill-over effects, one may not be able to detect any contemporaneous causality.

Similarly, Chambers' [4] empirical results indicate that bargaining does increase educational spending but that its effect is not statistically significant. However, the author notes that these results should be evaluated with caution because of the high degree of variation in estimated coefficients when slightly altered equations were used. There is also a possible cross-sectional bias distorting the impact of unionization on budgets; that is, in the short-run budgets are likely to be relatively fixed, say, for a school year.

TOWARD MORE STRUCTURED MODELS OF TEACHERS' COLLECTIVE BARGAINING

Of the two studies surveyed that developed and attempted to estimate empirically a structural model for teachers; pupil-teacher ratios and salaries were endogenous in both, with a measure of local district budget (expenditure per pupil) also endogenous in the more recent study by Chambers [4]. The results of these studies were somewhat ambiguous, and the model specifications were incomplete. First, neither study incorporated any measure of multilevel or multilateral negotiations which could influence budgetary decisions and the financing of education. It would appear that a first cut at conceptualizing a more complete structural model of collective bargaining in education can be expressed rather simply by the diagram in Figure 1.

The hypothesized model is reasonably self-explanatory and easily interpreted. The degree of union activity can directly influence a school district's budget (local, state, federal contributions), wage and non-wage benefits, resource allocations and working conditions. Certain educational resource allocations and working conditions can probably produce a feedback effect by increasing the degree of union activities.

Obvious measurement or errors-in-variables problems are associated with many of the hypothesized endogenous and exogenous variables. The most critical problem includes the measuring of union activity or bargaining power and educational outputs. Both of these concepts are multidimensional in character and not well understood. A variety of statistical procedures and variables can be considered candidates for selection. One immediate, though not completely satisfactory, measure of educational

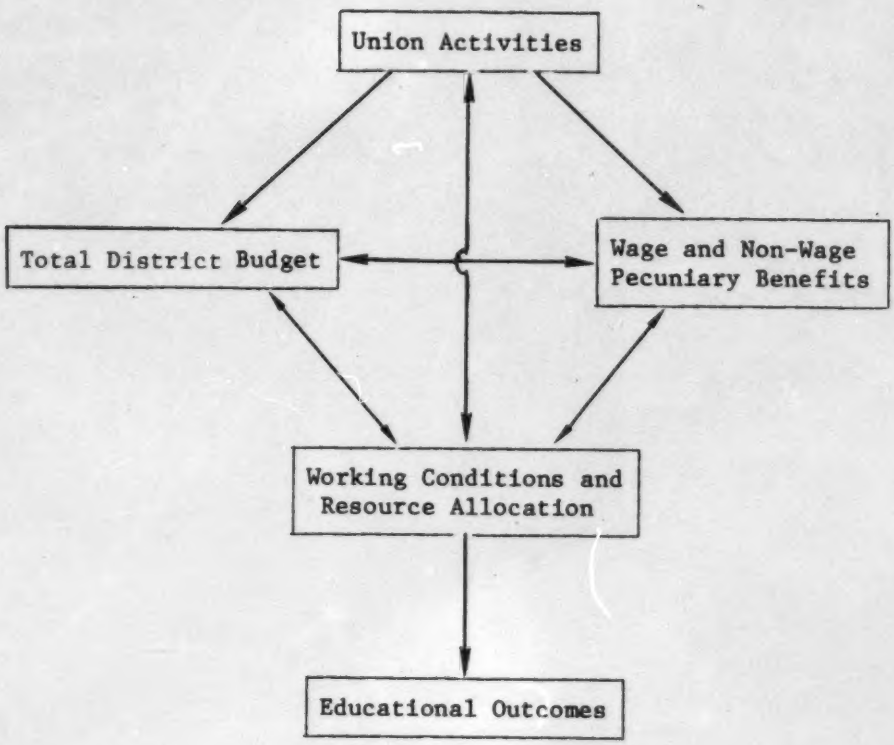


FIGURE 1

A STRUCTURAL DIAGRAM OF COLLECTIVE BARGAINING BY TEACHERS

output is student achievement as measured by a variety of standardized tests. The degree of multilevel or multilateral bargaining may be inferred from the number of public officials and others involved in the negotiations, the items included in the bargaining, and the content of final contracts between the teachers' union and the designated management unit.

Many important empirical and sampling problems remain that must be resolved before one begins to estimate a more structured model to assess the influence of teachers' collective bargaining on education. However, previous empirical research has concentrated overwhelmingly on a single economic issue, relative wages. On most other issues there is little to no quantitative empirical evidence to reach any conclusions with confidence of how teachers' collective bargaining affects the public educational process and a school district's resource allocations.

APPENDIX

COMPARISON OF STUDIES OF THE IMPACT OF UNIONIZATION ON PUBLIC SECTOR WAGE RATES[a]

	KASPER [17]	THORNTON [40]	BAIRD & LANDON [23]
Principal Findings (Union Impact)	o 0-4% increase in average salary	o 1-4% increase in salary at lower 3 steps o 23% increase in salary at highest step o Right to negotiate is necessary to have an impact.	o 4.9% increase in minimum salary due to negotiations
Research Design			
Unit of Observation	Individual states (+D.C.)	Sample of cities of 100,000+ population	Sample of school districts, 25,000 - 50,000
Public Employee Group	Teachers	Teachers	Teachers
Years Examined	1967-1968 school year	1969-1970 school year	1966-1967 school year
Sample Size	51	83	44
Model Specification			
Dependent Variable	o Average teachers' salary o Average teacher salary/ min. police salary	o Salary at each of 4 steps in pay scale	o Minimum salary
Independent Variables			
Unionization	o % teachers represented o % districts represented o % teachers covered by formal contract	o Dummy variable (1=negotiations) o Dummy variable for affiliation (1=AFT; 0=NEA)	o Dummy variable (1=negotiations) o % AFT o % NEA
Other Factors	o Per capita income o Urbanization o Expenditure/pupil o Region of U.S. o State & federal aid o Elem./Sec. teachers	o District size o Pupils/teacher o Excess demand for teachers o Prevailing private wage	o # of districts in county (Log) o Per capita income o % of revenue from local sources o Property tax rate
Functional Form	Additive	Additive	Additive
Structure Type	Reduce form and quasi-simultaneous equation	Reduced form	Reduced form

[a]All studies (except [4, 7]) summarized in Jones, Ralph T., "Public Sector Labor Relations: An Evaluation of Policy-Related Research," Contract Research Corporation, Belmont, Massachusetts, February 1975, pp. 206-209.

TABLE 1: COMPARISON OF STUDIES OF THE IMPACT OF UNIONIZATION ON PUBLIC SECTOR WAGE RATES

	HALL & CARROLL [11]	LIPSKY & DROTNING [26]	FREY [10]
Principal Findings (Union Impact)	o 1.8% increase in mean salary due to bargaining o Ambiguous results for class size	o 15% increase in salary change due to bargaining o 0-3% increase in salary level due to bargaining o Slightly greater gains at upper steps of pay scale	o -0.4 to 1.4% increase in salary due to bargaining
Research Design			
Unit of Observation	All elem. sch. dist. in Cook County	All sch. dist. in New York State	All New Jersey sch. dist., 750+ pupils
Public Employee Group	Teachers	Teachers	Teachers
Years Examined	1968-1969 school year	1967-1968	1964-1970
Sample Size	118	696	298
Model Specification			
Dependent Variable	o Mean salary o Average class size	o Change in mean salary o Mean salary level o Salary at each of 3 steps in pay scale	o Minimum salary and maximum salary
Independent Variables			
Unionization	Dummy variable (1=bargaining agreement)	Dummy variable (1= bargaining agreement)	Dummy variable (1=bargaining agreement)
Other Factors	o Median family income o % of white collar workers o Number of pupils o % of male teachers o Average years experience o State aid/expenditures	o District size o % of teachers with advanced degrees o % of teachers with 3 years experience o Pupils/teacher o Property value/pupil o Debt service/pupil	o Prevailing nurses wages o District size o Median family income o Property value/pupil
Functional Form	Additive	Additive	Interactive (Log-Linear plus special interaction variable)
Structure Type	Reduced form and simultaneous equation	Reduced form	Reduced form

TABLE 1: COMPARISON OF STUDIES OF THE IMPACT OF UNIONIZATION ON PUBLIC SECTOR WAGE RATES

	SCHMENNER [35]	ASHENFELTER [2]	EHRENBERG [6]
Principal Findings (Union Impact)	o 12-14% teacher salary increase o 15% police-fire salary increase o Mixed results for other employees	o 0-10% annual salary increase o 3-9% reduction in hours o 6-16% hourly salary increase	o 0-9% annual salary increase o 2-9% reduction in hours o 2-18% hourly salary increase
Research Design			
Unit of Observation	11 major cities	Sample of cities, 25,000 to 100,000 population	Sample of cities, 25,000 to 250,000 population
Public Employee Group	Teachers; police-fire; other	Firefighters	Firefighters
Years Examined	1962-1970	1961-1966	1969
Sample Size	57-80	74-130	270
Model Specification			
Dependent Variable	o Min. teacher salary o Min. police-fire salary o Average other worker earnings	o Average annual wages o Average hours worked o Average hourly wages	o Minimum & maximum wages (annual and hourly) o Average salary (annual & hourly) o Average hours worked
Independent Variables			
Unionization	o % union o Dummy variable (1=bargaining) o Work stoppage/employee	o Dummy variable (1=IAFF Local)	o Dummy variable (1=IAFF Local) o Dummy variable (1=IAFF Contract)
Other Factors	o City/SMSA population o Prevailing opportunity wage o Tax rate change	o Price index (prevailing wage)	o District size o Government type o Family income o Population density o Prevailing minimum wage o % of police unionized o % non-white o Housing value o Population education level
Functional Form	Additive & interactive (Log-Linear)	Interactive (Log-Linear)	Interactive (Log-Linear)
Structure Type	Reduced form	Reduced form	Reduced form

TABLE 1: COMPARISON OF STUDIES OF THE IMPACT OF UNIONIZATION ON PUBLIC SECTOR WAGE RATES

	FREUND [9]	CHAMBERS [4]	EHRENBERG & GOLDSTEIN [7]
Principal Findings (Union Impact)	o No salary difference	o 8-17% teacher salary increase o 4-12% increase Admin. salary o Ambiguous impact on class size o Ambiguous impact on local budget	o 2-16% increased average salary of noneducational personnel o Significant interoccupational spillover o Significant geographical spillover (suburban to urban)
Research Design			
Unit of Observation	Sample of cities, 50,000+ population	School district (elementary & unified) State of California	Sample of cities, 25,000+ population
Public Employee Group	All municipal employees		Fiscal Adm., gen. control, streets & highways, police, fire, sewer & sanitation, parks & recreation
Years Examined	1965-1971	1970-1971	1967
Sample Size	40-80	39 elementary, 50 unified	478
Model Specification			
Dependent Variables (endogenous)	o % change in average earnings from 1965-1971	o Teachers' base salary o Salary increments for education and experience o Principal's salary o Superintendent's salary o Teacher/pupil ratio o Revenue per pupil	o Average monthly earnings of each public employees' category
Independent Variables			
Unionization	o % member of union o Dummy variable (1=strike) o Dummy variable (1=arbitration)	o Dummy variable (1=formal bargaining) o % teachers in county covered by bargaining	o % represented by union or association
Other Factors	o Change in employee mix o Change in prices o Change in prevailing wage o Legal constraints on unions o Constraints on union political activity	o Disposable income/household o State and federal aid/pupil o Average wage in civilian sector (nurses) o Average daily attendance o % elementary pupils o % black pupils o % Spanish pupils o Pupils/household	o Dummy variable (1=city manager) o Dummy variable (1=commission) o Per capita funds from higher level of government o Population density
Functional Form	Additive	Additive	Additive; Log-Linear
Structure Type	Reduced form	Simultaneous equation, reduced form	Reduced form

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